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**CLAIMS**


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(57) [Claim(s)]

[Claim 1] When it has the following and the aforementioned first rotation section and the second rotation section rotate relatively It is characterized by for the both sides of the center section of the aforementioned turn section (31a, 32a) drawing a smooth curve, and transforming them. Electric conductor twist equipment which twists the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the segmented letter of the abbreviation for U characters which is attached to the annular stator core (1) in which many slots (2) were prepared together with the hoop direction. The first rotation section holding one bay (31b, 32b) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters (11) The bay (31c, 32c) of another side of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters is held, and it is the second rotation section (12) which can rotate relatively [ section / first rotation / aforementioned ]. The hoop-direction supporter which supports only the center section of the direction of a path of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters from the first and second hoop directions of the rotation section, and restricts movement to the hoop direction of the aforementioned turn section (31a, 32a) (16a)

[Claim 2] The aforementioned hoop-direction supporter (16a) is electric conductor twist equipment given in the 1st term of a claim characterized by supporting so that it may face only across the center section of the turn section (31a, 32a) of the aforementioned electric conductor (3, 31, 32) from hoop-direction both sides.

[Claim 3] the bay (31b, 31c, 32b, 32c) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters -- the [ the aforementioned first rotation section (11) and ], when held at the 2 rotation sections (12) Electric conductor twist equipment given in the 1st term of a claim or the 2nd term characterized by having the electric conductor presser-foot member (16) which contacts the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters.

[Claim 4] The aforementioned hoop-direction supporter (16a) is electric conductor twist equipment given in either the 1st term of a claim characterized by being formed as a salient extended from the aforementioned electric conductor presser-foot member (16) so that it may face across the center section of the turn section (31a, 32a) of the aforementioned electric conductor (3, 31, 32) from hoop-direction both sides, or the 3rd term.

[Claim 5] The electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters Two or more kinds of aforementioned electric conductors (31 32) with which the radius of curvatures of the aforementioned turn section (31a, 32a) differ are included. the aforementioned first rotation section (11) and the aforementioned second rotation section (12) the bay (31b --) which is in the one side of two or more aforementioned electric conductors (31 32) made multiplex about the turn section (31a, 32a) from which the aforementioned radius of curvature differs 32b and the bay (31c, 32c) in the other side are held, respectively. the aforementioned hoop-direction supporter (16a) Electric conductor twist equipment given in either the 1st term of a claim characterized by having restricted

movement to the hoop direction of two or more aforementioned turn sections (31a, 32a) made multiplex [ aforementioned ], or the 4th term.

[Claim 6] Maintenance of the bay (31b, 31c, 32b, 32c) of the aforementioned electric conductor (3, 31, 32) in the aforementioned first rotation section (11) and the aforementioned second rotation section (12) Electric conductor twist equipment given in either the 1st term of a claim characterized by being carried out by the attaching part (111, 112, 121, 122) drilled by the shaft orientations of the aforementioned first rotation section (11) and the aforementioned second rotation section (12), or the 5th term.

[Claim 7] The aforementioned attaching part (111, 112, 121, 122) is electric conductor twist equipment given in the 6th term of a claim characterized by being formed in a hoop direction at equal intervals corresponding to the number of the aforementioned slots (2) of the aforementioned stator core (1).

[Claim 8] It is prepared in the aforementioned electric conductor presser-foot member (16) and an opposite side to the aforementioned first rotation section (11) and the aforementioned second rotation section (12). It moves contacting the point (31d, 31e, 32d, 32e) of the aforementioned electric conductor, after the turn section (31a, 32a) of the aforementioned electric conductor is twisted. Electric conductor twist equipment given in either the 1st term of a claim characterized by the thing which push up the aforementioned electric conductor in the direction of the aforementioned electric conductor presser-foot member (16), and for which it pushes up and has a member (17), or the 7th term.

[Claim 9] How to twist an electric conductor which is equipped with the following and characterized by for the center-section both sides of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters drawing a smooth curve, and transforming them in the aforementioned twist process. The first rotation section (11) The array process which inserts the bay (31b, 31c, 32b, 32c) of the electric conductor (3, 31, 32) of the segmented letter of the abbreviation for U characters which forms a stator coil in the attaching part (111, 112, 121, 122) which has the aforementioned first rotation section (11) and this heart, and was drilled relatively [ section / (11) / 1st rotation ] by shaft orientations with the second rotation section (12) which can rotate. The turn section support process which supports only the center section of the direction of a path of the aforementioned turn section (31a, 32a) from a hoop direction so that the movement to the hoop direction of the aforementioned first rotation section (11) of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters and the aforementioned second rotation section (12) may be restricted. The twist process which is made to rotate relatively the aforementioned first rotation section (11) and the aforementioned second rotation section (12), and twists the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters where only the center section of the direction of a path of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for

[Claim 10] How to twist the electric conductor given in the 9th term of a claim characterized by supporting in the aforementioned turn section support process so that it may face only across the center section of the turn section (31a, 32a) of an electric conductor (3, 31, 32) from hoop-direction both sides.

[Claim 11] the [ the 9th term of a claim characterized by having the turn section presser-foot process which contacts an electric conductor presser-foot member (16) after the aforementioned array process at the aforementioned turn section (31a, 32a) that the relief of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters should be prevented, or ] -- how to twist an electric conductor given in 10 terms

[Claim 12] The aforementioned turn section support process by the salient (16a) extended from the aforementioned electric conductor presser-foot member (16) so that it may face across the center section of the turn section (31a, 32a) of the aforementioned electric conductor (3, 31, 32) from hoop-direction both sides How to twist the electric conductor given in the 11th term of a claim characterized by being what performed by supporting the center section of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters from hoop-direction both sides.

[Claim 13] The electric conductor (3, 31, 32) of the letter of the aforementioned abbreviation for U characters is how to twist the electric conductor of a publication in either the 9th term of a claim

characterized by plurality being arranged by the hoop direction in the aforementioned array process, or the 12th term.

[Claim 14] The aforementioned turn section (31a, 32a) of the electric conductor (31 32) of two or more letters of the aforementioned abbreviation for U characters which has the turn section (31a, 32a) from which radius of curvature differs in the aforementioned array process is made multiplex. To the aforementioned attaching part (111 112) drilled in the aforementioned first rotation section (11), the bay (31b, 32b) in the one side of the aforementioned turn section (31a, 32a) And the bay (32b, 32c) in the other side of the aforementioned turn section (31a, 32a) is how to twist the electric conductor of a publication in either the 9th term of a claim characterized by being arranged by the aforementioned attaching part (121 122) drilled in the aforementioned second rotation section (12), respectively, or the 13th term.

[Claim 15] The aforementioned electric conductor presser-foot member (16) and the electric conductor push raising member (17) prepared in the opposite side to the aforementioned first rotation section (11) and the aforementioned second rotation section (12) After the turn section (31a, 32a) of the aforementioned electric conductor is twisted, the point (31d, 31e, 32d, 32e) of the aforementioned electric conductor is contacted. the aforementioned electric conductor -- the aforementioned electric conductor presser foot -- a member -- how to twist the electric conductor of a publication in either the 9th term of a claim characterized by the thing which push up to a direction, and for which it pushes up and has a process, or the 14th term

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

Technical field this invention relates to the manufacture method of the AC-generator stator for vehicles carried in a passenger car, a truck, etc., and its manufacturing installation.

Background technology The further high increase in power is called for with the AC generator for vehicles in recent years. Therefore, it is necessary to attain low resistance-ization and overall-length reduction of an electric conductor is required in a stator coil.

In order to respond to the request of the high increase in power of the AC generator for vehicles conventionally, the electric conductor of the shape of two or more U character is inserted in two or more slots prepared in the stator core from the same, and what forms a stator coil is proposed by joining them with the international public presentation/[ 92nd ] No. 06527 alder edge mill (1992). With this composition, since the electric conductor with which the shape of U character was segmented can be put in order regularly, the electric conductor within a slot can be formed into a high space factor, and a high increase in power becomes possible.

also in the above-mentioned conventional technology, at the twist process by the side of the turn section, as shown in a view 16, the turn sections 301a, 302a, and 303a of segments 301, 302, and 303 are held by the retaining ring 310 And Bays 301b, 302b, and 303b are twisted, it inserts in fixtures 311 and 312, and the twist fixtures 311 and 312 are twisted to an opposite direction only T/2 (T means a magnetic pole angle pitch) focusing on a retaining ring 310, respectively. Consequently, as shown in a view 17, the segments 301, 302, and 303 by which Bays 301b, 302b, and 303b were twisted T/2 are obtained.

By this method, since the whole circular portion of the turn sections 301a, 302a, and 303a of segments 301, 302, and 303 is held by the retaining ring 310, compared with the case where it twists without a retaining ring 310, the part coil end of the turn sections 301a, 302a, and 303a inserted into the retaining ring 310 becomes high, as a result the whole coil becomes long.

Indication of invention this invention is made in view of the above-mentioned problem, and it aims at offering the manufacture method of the low stator of the height of a coil end, and a manufacturing installation.

The first rotation section in which the manufacturing installation for attaining the above-mentioned purpose holds one bay (31b, 31c, 32b, 32c) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters (11), The bay (31b, 31c, 32b, 32c) of another side of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters is held. relatively [ section / (11) / first rotation ] The second rotation section which can rotate (12), The center of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters is supported, and it is characterized by having the hoop-direction supporter (16a) which restricts movement to the hoop direction of the turn section (31a, 32a).

according to this -- the turn section (31a --) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters the time of 32a being twisted -- a hoop-direction supporter (16a) -- the turn section (31a, 32a) -- a hoop direction -- moreover -- the direction of a path of the turn section (31a, 32a) -- it has faced only across the center section mostly and the portions of the direction inside of a path of

the turn section (31a, 32a) and an outside are not restrained Therefore, in the twist process by the side of the turn section (31a, 32a), if the bay (31b, 31c, 32b, 32c) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters can extend to a hoop direction, it will be stood still, without only the center of the turn section (31a, 32a) carrying out a position gap, and the both sides of the turn section (31a, 32a)

Moreover, the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters Two or more kinds of electric conductors (3, 31, 32) with which the radius of curvatures of the turn section (31a, 32a) differ are included. the first rotation section (11) and the second rotation section (12) the bay (31b - -) which is in the one side of two or more electric conductors (3, 31, 32) made multiplex about the turn section (31a, 31a) from which radius of curvature differs 31c, 32b, 32c, and the bay (31b, 31c, 32b, 32c) in the other side are held, respectively, and the hoop-direction supporter (16a) is characterized by having restricted movement to the hoop direction of two or more turn sections (31a, 32a) made multiplex. According to this, it becomes possible to twist simultaneously two or more turn sections (31a, 32a) made multiplex.

in addition, maintenance of the bay (31b, 31c, 32b, 32c) of an electric conductor (3, 31, 32) -- the [ the first rotation section (11) and ] -- it can carry out by the attaching part (111, 112, 121, 122) drilled by the shaft orientations of the 2 rotation sections (12)

Moreover, an attaching part (111, 112, 121, 122) can be made to be able to respond to the number of slots (2), and it can be made to form in a hoop direction at equal intervals.

According to this, it becomes possible to twist simultaneously the turn section (31a, 32a) of the electric conductor (3, 31, 32) corresponding to the number of slots (2).

The manufacture method for attaining the above-mentioned purpose The first rotation section (11) and the second rotation section (12), The array process which inserts the bay (31b, 31c, 32b, 32c) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters in the attaching part (111, 112, 121, 122) drilled by shaft orientations, So that the movement to the circumference direction of the turn section (31a, 32a) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters may be restricted the [ the turn section support process which supports only the center of the turn section (31a, 32a), and / the first rotation section (11) and ] -- it is characterized by having the twist process which rotates the 2 rotation sections (12) relatively

the time of the turn section (31a, 32a) being twisted according to this -- a hoop-direction supporter (16a) -- the turn section (31a, 32a) -- a hoop direction -- moreover -- the direction of a path of the turn section (31a, 32a) -- it has faced only across the center section mostly Therefore, if the bay (31b, 31c, 32b, 32c) of the electric conductor (3, 31, 32) of the letter of the abbreviation for U characters can extend to a hoop direction, it will be stood still, without only the center of the turn section (31a, 32a) carrying out a position gap, and the both sides of the turn section (31a, 32a) will draw and transform a smooth curve. In addition, an electric conductor (3, 31, 32) can make a hoop direction arrange plurality. Moreover, it can also make multiplex arrange by carrying out the turn section (31a, 32a) from which radius of curvature differs.

This becomes possible to twist simultaneously the turn section (31a, 32a) of two or more electric conductors (3, 31, 32).

Easy explanation of a drawing A view 1 is a perspective diagram of the stator core and insulator which are used for manufacture of the stator concerning the operation gestalt of this invention, and a segment. A view 2 is a perspective diagram of the segment in front of a twist. A view 3 is a perspective diagram of the turn section side twist fixture of a segment. A view 4 is a cross section of turn section side twist equipment. A view 5 is a fragmentary sectional view showing a segment and a segment presser foot. A view 6 is a perspective diagram of the segment after a twist. A view 7, the \*\* type view showing the process which extracts a segment from turn section side twist equipment, and an octavus view are drawings showing the segment maintenance state by the outer-diameter side side holder and the bore side holder. A view 9 is drawing showing the point plug process of a segment. A view 10 is drawing showing the process which removes an outer-diameter side side holder and a bore side holder from a segment. A view 11 is drawing showing the process which pushes in a segment in a slot. A view 12 is a

partial cross section of a stator. A view 13 is a partial perspective diagram of a stator. A view 14 is a flow chart showing the manufacture method of a stator. A view 15 is drawing showing the process which pushes in the segment concerning other operation gestalten in a slot. A view 16 and the 17th view are drawings showing the fixture which twists the conventional turn section side. The best gestalt for inventing The operation gestalt which shows this invention in drawing is explained hereafter.

(The first operation gestalt)

The manufacture method of the AC-generator stator for vehicles and manufacturing installation concerning the operation gestalt of this invention are explained based on a view 14 from a view 1. A view 1 is a perspective diagram showing the electric conductor of the shape of the stator core and insulator which are used for manufacture of the stator concerning the operation gestalt of this invention, and U character.

A stator coil inserts from the same the U character-like electric conductor (it is called a segment below) 3 with which plurality was segmented by two or more slots 2 prepared in the annular stator core 1 together with the hoop direction, and is formed by joining those points.

First, the segment 3 inserted in a slot 2 cuts the copper wire of a straight angle cross section to predetermined length, and is bent in the shape of abbreviation for U characters. There is a segment 3 bent in the shape of this abbreviation for U characters two kinds of size, as shown in a view 2, and it is formed in a configuration in which turn section 32a of the large segment 32 surrounds turn section 31a of the small segment 31, respectively. In addition, the points 31d and 31e of the small segment 31 are formed for the points 32d and 32e of the large segment 32 in the shape of a taper towards the outside from the inside towards the inside, respectively from the outside.

The view 3 shows the perspective diagram of the turn section side twist fixture of a segment 3, and the view 4 shows the cross section of a turn section side twist fixture. The turn section side twist fixture 10 consists of the rotation drives 13 and 14 which carry out the rotation drive of the inside twist section 11, the outside twist section 12, the inside twist section 11, and the outside twist section 12, respectively, a controller 15, segment presser foot 16, and segment push raising fixture 17 grade.

the segment insertion which the bays 31b and 32b of a segment 3 are inserted in the inside twist section 11, and is held -- holes 111 and 112 are adjoined and drilled in the direction of a path this segment insertion -- holes 111 and 112 arrange only the number (this operation form 36) corresponding to the number of the slots 2 of the stator manufactured in a hoop direction at equal intervals, and are formed That is, in this operation form, 36 segment insertion holes 111 and 112 put in order by the hoop direction at equal intervals are formed by this heart. 36 segment insertion holes 121 and 122 put in order by the hoop direction at equal intervals are similarly formed by this heart about the outside twist section 12. consequently -- the inside twist section 11 and the outside twist section 12 -- the inside to four segment insertion -- holes 111, 112, 121, and 122 are located in a line, and are formed

the segment insertion by which the segment 3 of 1 set of size bent as shown in a view 2 is drilled in the inside twist section 11 and the outside twist section 12 -- the turn sections 31a and 32a are made multiplex, and it collects into holes 111, 112, 121, and 122, and is inserted in them namely, the bays 32b and 32c of the large segment 32 -- the segment insertion by the side of the inner circumference of the inside twist section 11 -- the segment insertion by the side of the periphery of a hole 111 and the outside twist section 12 -- it inserts in a hole 122, respectively -- having -- the bays 31b and 31c of a small segment -- the segment insertion by the side of the periphery of the inside twist section 11 -- the segment insertion by the side of the inner circumference of a hole 112 and the outside twist section 12 -- it is shown in a view 3 -- as -- the group of the large and small segment 3 -- segment insertion of the inside twist section 11 and the outside twist section 12 -- it is arranged and set to holes 111, 112, 121, and 122 by the hoop direction

all segment insertion -- after segments 31 and 32 are inserted in holes 111, 112, 121, and 122, the annular segment presser foot 16 is contacted by turn section 32a of the large segment 32 from the upper part of the inside twist section 11 and the outside twist section 12 Since turn section 31a of the small segment 31 is surrounded by turn section 32a of the large segment 32, turn section 31a of the small

segment 31 is pressed down by turn section 32a of the large segment 32. thereby -- the large and small segment 3 -- segment insertion -- it can prevent losing touch with holes 111, 112, 121, and 122  
 a view 5 -- segment insertion -- it is the fragmentary sectional view showing the segment and segment presser foot which are inserted in the hole Salient 16a of the shape of a cylinder inserted from shaft orientations among each turn sections 31a and 32a of the segment 3 of the size which adjoins a hoop direction is prepared in the segment presser foot 16. This salient 16a is located in the simultaneously center section of the direction of a path of each turn sections 31a and 32a of the large and small segment 3. And it has restricted that the center section of the segment 3 moves to a hoop direction as a part for the center section of the turn sections 31a and 32a is inserted from the hoop-direction both sides of the large and small segment 3.

The rotation drive of the inside twist section 11 and the outside twist section 12 is carried out by the rotation drives 13 and 14 controlled by the controller 15, respectively. With this operation gestalt, it sees from the upper part of the turn section side twist fixture 10, and the inside twist section 11 is carried out and  $T/2$  (a part for 1.5 slots [ This operation gestalt ]) rotation drives of the outside twist section 102 are carried out clockwise counterclockwise, respectively. Thereby, the turn sections 31a and 32a of the large and small segment 3 are twisted by the hoop direction.

In case the turn sections 31a and 32a of a segment 3 are twisted, moreover, only the hoop direction has pinched only the simultaneously center section of salient 16a of the direction of a path of the turn sections 31a and 32a for the turn sections 31a and 32a, and it is not restraining the portions of the direction inside of a path of the turn sections 31a and 32a, and an outside. Therefore, in the twist process by the side of turn section 31a and 32a, if the bays 31b, 31c, 32b, and 32c of the large and small segment 3 can extend to a hoop direction, it will be stood still, without only the center of the turn sections 31a and 32a carrying out a position gap, and the both sides of the turn sections 31a and 32a will draw and transform a smooth curve. Consequently, the segment 3 of the size by which the turn sections 31a and 32a were twisted as shown in a view 6 is obtained. In addition, rotating relatively is important for both the twists sections 11 and 12, and they may fix one side and may carry out the rotation drive only of another side.

Next, the segment 3 of the size by which the turn section 31a and 32a side was twisted is extracted from the turn section side twist fixture 10, and the process which inserts the large and small segment 3 in the slot 2 of a stator core 1 is explained.

The \*\* type view showing the process at which a view 7 extracts the segment which had the turn section twisted from turn section side twist equipment, and an octavus view are drawings showing the segment maintenance state of an outer-diameter side side holder and a bore side holder. Under the inside twist section 11 and the outside twist section 12, it has the segment push raising fixture 17. When the segment 3 of the size by which the turn section 31a and 32a side was twisted in the turn section side twist fixture 10 raises the segment push raising fixture 17, the points 31d, 31e, 32d, and 32e of a segment are made the shaft-orientations upper part. thereby -- a part of bays 31b, 31c, 32b, and 32c of segments 31 and 32 -- segment insertion -- it escapes from and comes upwards from holes 111, 112, 121, and 122 segment insertion -- the bays 31b, 31c, 32b, and 32c which escaped from and came out of holes 111, 112, 121, and 122 are held by the outer-diameter side side holder 21 and the bore side holder 22

The outer-diameter side side holder 21 has the ctenidium 211 and the ctenidium attachment component 212. the ctenidium attachment component 212 is an annulus ring tabular, and corresponds to the number of the slots 2 of a stator 1 -- making -- the hole of the shape of 36 rectangle -- 212a is formed in the radial The ctenidium 211 is formed from tooth part 211b to which the single-sided side of the hoop direction of cross-section rectangle-like fuselage section 211a and fuselage section 211a was extended in the bore direction. in addition, the cross-section configuration of fuselage section 211a of a ctenidium 211 -- a hole -- it is made to correspond to the configuration of 211a, and is formed moreover, fuselage section 211a of a ctenidium 211 -- a hole -- 212a is penetrated And a ctenidium 211 is movable in the direction of a path with a drive 215.

the extrusion to which the bore side holder 22 extrudes the bore side attachment component 221 of two or more flabellates, and the bore side attachment component 221 in the outer-diameter direction -- it has

the member 222 The bore side of the bore side attachment component 221 is caudad turned from the upper part, and is formed in the shape of a taper. moreover, extrusion -- the lower part of a member 222 has become cone-like, is turned caudad and is sharp

a ctenidium 211 -- the bore direction from an outer diameter -- turning -- moving -- segment insertion -- tooth part 211b is inserted among the bays 31b, 31c, 32b, and 32c which adjoin the hoop direction which escaped from and came out of holes 111, 112, 121, and 122 In addition, the nose of cam of tooth part 211b is formed in the shape of a taper, and makes easy insertion of a between [ the bays 31b, 31c, 32b, and 32c which adjoin a hoop direction ].

Bays 31b, 31c, 32b, and 32c have a lateral portion held by lateral part 211e of other tooth part 211b which adjoins 211d of inside sections of tooth part 211b of 1 in the side of the hoop direction. In addition, since a segment 3 is made shaft orientations before it is held by the ctenidium 211, the thing [ that push up and only length holds a downward position from the upper limit of Bays 31b, 31c, 32b, and 32c ] is possible.

extrusion -- a member 222 is movable in the vertical direction with a drive 223 the bore side of the bore side attachment component 221 -- extrusion -- it is in contact with the cone-like portion of a member 222 therefore, extrusion -- when a member 222 moves caudad, the bore side attachment component 221 moves in the outer-diameter direction Thereby, periphery side 221a of the bore side attachment component 221 contacts bay 32b inside [ maximum ] the segment 3 located in a line in the direction of a path, and presses the bays 31b, 31c, 32b, and 32c of four segments 3 in the outer-diameter direction.

On the other hand, when a ctenidium 211 moves in the bore direction, outer-diameter side attaching part 211c of the root portion of tooth part 211b of the outer-diameter side side holder 21 contacts bay 32c of the maximum outside of the segment 3 located in a line in the direction of a path, and presses the bays 31b, 31c, 32b, and 32c of four segments 3 in the bore direction. Thereby, four segments 3 located in a line in the direction of a path are held by periphery side 221a of the bore side attachment component 221, and outer-diameter side attaching part 211c of the outer-diameter side side holder 21 in the direction of a path.

After Bays 31b, 31c, 32b, and 32c are held by the outer-diameter side side holder 21 and the bore side holder 22 in a hoop direction and the direction of a path, a segment 3 is extracted from turn section side twist equipment 10 by moving the outer-diameter side side holder 21 and the bore side holder 22 up. In addition, movement to the upper part of the outer-diameter side side holder 21 and the bore side holder 22 is performed by synchronizing the support plate 213 which is supporting the outer-diameter side side holder 21, and the bore side holder 22 with drives 214 and 224, and going up and down.

Drawing showing [ 9 ] the point plug process of a segment, drawing showing the process at which a view 10 removes an outer-diameter side side holder and a bore side holder from a segment, and the 11th view are drawings showing the process which pushes in a segment in a slot.

As shown in a view 9, the stator core 1 equipped with the insulator 4 in each slot 2 is beforehand installed in the bottom of the segment attachment fixture 20. Positioning of a hoop direction is made by the stator core 1 so that a slot 2 may be in agreement with the position corresponding to the segment 3 currently held by the outer-diameter side side holder 21 and the bore side holder 22. And the points 31d, 31e, 32d, and 32e of the segment 3 currently held are inserted into a slot 2 from the shaft-orientations upper part of a stator core 1 by dropping the outer-diameter side side holder 21 and the bore side holder 22.

under the present circumstances, the outer-diameter side side holder 21 and the bore side holder 22 push up, and are based on a fixture 17 -- it pushes up and only length holds the downward position from the upper limit of the bays 31b, 31c, 32b, and 32c of a segment 3 Since the position near Points 31d, 31e, 32d, and 32e is held, in the insertion process to a slot 2, the turn sections 31a and 32a are held, and it makes it possible to make positioning accuracy high rather than inserting in a slot 2. That is, holders 21 and 22 are also the interior of a proposal which shows opening of a slot 2 to the nose of cam of a segment 3 while being attachment components which hold two or more segments 3 possible [ conveyance ] with an array state. Moreover, point 32c by the side of the diameter of the outermost and 32d of points by the side of the maximum bore serve as a taper configuration which inclined inside as



mentioned above among four segments 3 located in a line in the direction of a path. Therefore, four segments 3 located in a line in the direction of a path become possible [ inserting smoothly into a slot 2 ].

Moreover, in case the points 31d, 31e, 32d, and 32e of a segment 3 are inserted into a slot 2, the hoop-direction both sides of the turn sections 31a and 32a are supported by salient 16a formed in the segment presser foot 16. Therefore, since a gap of the hoop direction of a segment 3 can be prevented, it becomes possible to raise positioning accuracy further.

While moving the outer-diameter side side holder 21 in the outer-diameter direction as shown in a view 10 after the points 31d, 31e, 32d, and 32e of a segment 3 are inserted into a slot 2, the bore side holder 22 is moved up and a segment 3 is opened from maintenance. And as shown in a view 11, the turn sections 31a and 32a of a segment 3 are pressurized through the segment presser foot 16 by dropping the segment pressurization section 23 from the upper part. And a segment 3 is pushed in in a slot 2 until it becomes a predetermined coil and predetermined height.

In case a segment 3 is pushed in in a slot 2, turn section 32a of the large segment 32 is pressed down from the upper part by the segment presser foot 16. Moreover, when salient 16a currently formed in the inferior surface of tongue of the segment presser foot 16 sandwiches a part for the center section of the turn sections 31a and 32a from hoop-direction both sides, movement of the hoop direction of a segment 3 is restricted. By this salient 16a, the gap of the hoop direction of a segment 3 was prevented, the interference to the hoop-direction wall surface of the slot 2 at the time of a segment 3 being inserted in a slot 2 was prevented, and generating of the blemish of a segment 3 is prevented.

As a result of inserting the bays 31b, 31c, 32b, and 32c of four segments 3 located in a line in the direction of a path into a slot 2, four segments are arranged in in a slot as shown in the cross section showing in a view 12.

After arranging a segment 3 into each slot 2, each class of the bays 31b, 31c, 32b, and 32c of the segment 3 which came out from the end of a slot 2 is twisted by the circumference direction retrose  $T/2$  (a part for 1.5 slots [ This operation gestalt ]) by turns with the point side twist equipment which is not illustrated. Namely, with this operation gestalt, the electric conductor 3 of the 1st layer and the 3rd layer is twisted  $T/2$  in the circumference direction from a bore side, and a two-layer eye and the electric conductor 3 of the 4th layer are twisted  $T/2$  in the circumference direction contrary to the electric conductor 3 of the 1st layer and the 3rd layer. The sense of the twist of this each class is the same over stator-core 1 perimeter, therefore the segment 3 inclines in the same direction over a perimeter within each class.

After twisting the bays 31b, 31c, 32b, and 32c of each segment 3 to a hoop direction, the insulating coat of the points 31d, 31e, 32d, and 32e of each segment 3 is removed. Removal of an insulating coat takes out the stator core after the point side was twisted, and is performed by dipping the points 31d, 31e, 32d, and 32e of a segment 3 in a strong base, and melting them. Then, it is joined so that 32d of points of the 1st layer, 31d of points of a two-layer eye, point 31e of the 3rd layer, and point 32e of the 4th layer may obtain an electric flow from a inner layer side using TIG arc welding, low attachment, resistance welding, electron beam welding, laser welding, etc., and the stator coil of a three phase circuit as shown in a view 13 is formed.

The manufacture method of the stator by the stator manufacturing installation stated above is shown in the flow chart of a view 14.

That is, the process which extracts the segment 3 by which the process and turn section 31a [ which twists the process and turn section 31a / which manufactures two or more segments 31 and 32 /, and 32a side ], and 32a side was twisted is performed. And the process which fixes the stator core equipped with the insulator 4 in the slot 2 is performed, and the process which puts a segment 3 in the slot 2 of the stator core 1, the process which twists a point side, and the junction process which joins the points 31d, 31e, 32d, and 32e of a segment are performed. In addition, the process of the coat removal included in the junction process can also be included in a junction process or before, for example, a segment manufacturing process.

Although salient 16a of the turn sections 31a and 32a has restricted movement of a hoop direction with

this operation gestalt in case the turn sections 31a and 32a of a segment 3 are twisted, turn section 31a and the whole 32a are not held. Therefore, it becomes possible to be able to stop the height of the coil end by the side of turn section 31a and 32a, consequently to shorten a coil and merit.

Moreover, with this operation gestalt, in case a segment 3 is inserted in a slot 2, not the turn sections 31a and 32a but the bays 31b, 31c, 32b, and 32c are held. That is, the segment 3 is held in the position near the points 31d, 31e, 32d, and 32e of the segment 3 inserted in a slot 2. Therefore, compared with the case where piece support of the segment 3 is being carried out, the positioning accuracy of Points 31d, 31e, 32d, and 32e improves only in the turn sections 31a and 32a. Consequently, in case a segment 3 is inserted in a slot 2, it becomes possible to reduce the blemish of the segment 3 generated when a segment 3 interferes to the internal surface of a slot 2. In addition, even when the number of slots increases by this method, it is possible to secure the positioning accuracy of a segment 3.

In addition, with this operation gestalt, interference of the segment 3 to the hoop-direction internal surface of a slot 2 is reduced by holding the segment 3 to the hoop direction by the ctenidium 211 of the outer-diameter side side holder 21. Moreover, interference of the segment 3 to the direction internal surface of a path of a slot 2 is reduced by holding the segment 3 in the direction of a path by periphery side 221a of the bore side attachment component 221, and outer-diameter side attaching part 211c of the outer-diameter side side holder 21.

Moreover, in this operation gestalt, in case a segment 3 is pushed in in a slot 2, when salient 16a sandwiches a part for the center section of the turn sections 31a and 32a from hoop-direction both sides, movement of the hoop direction of a segment 3 is restricted. By this salient 16a, the gap of the hoop direction of a segment 3 was prevented and the interference to the hoop-direction wall surface of the slot 2 at the time of a segment 3 being inserted in a slot 2 is prevented.

Moreover, in this operation gestalt, the process which extracts the segment 3 by which the process and turn section 31a [ which twists the turn section 31a and 32a side ], and 32a side was twisted, the process which puts a segment 3 in the slot 2 of a stator core 1, the process which twists a point side, and the process which removes a coat are simultaneously performed about two or more segments 3. Therefore, a manufacture man day can be reduced and it becomes possible to cut down a manufacturing cost.

(The second operation gestalt)

A view 15 is drawing showing the process which pushes in the segment of the stator manufacturing installation concerning the second operation gestalt of this invention in a slot. With the second operation gestalt, processes other than the above-mentioned pressurization pushing process are the same as the first operation gestalt.

In the second operation gestalt, the segment attachment fixture 20 is further equipped with the segment shaft-orientations supporter 24. The segment shaft-orientations supporter 24 is installed in the side and opposite side for supporting the points 31d, 31e, 32d, and 32e of a segment 3 which it is and by which the points 31d, 31e, 32d, and 32e of a segment 3 are inserted in a stator core 1.

A segment 3 is pressurized by the segment pressurization section 23 in a pressurization pushing process, supporting the points 31d, 31e, 32d, and 32e with the segment shaft-orientations supporter 24.

Thereby, in a pressurization pushing process, a segment 3 is pushed in in a slot 2, while both the turn sections 31a and 32a and the points 31d, 31e, 32d, and 32e are restrained. A bore and outer-diameter side is uniformly inserted into a slot 2 to the direction of a path of a segment 3 by supporting Points 31d, 31e, 32d, and 32e. Therefore, the bays 31b, 31c, 32b, and 32c of a segment 3 can reduce that a blemish sticks within a slot 2.

(others -- operation form)

In addition, the cross-section configuration of an electric conductor is good also as a round-head cross section. the case where a wire is used -- segment insertion of the turn section side twist fixture 10 -- the configuration of holes 111, 112, 121, and 122 is made into a round shape

Moreover, the attachment component held possible [ conveyance of two or more segments 3 ] and the interior material of a proposal which shows the points 31d, 31e, 32d, and 32e of the bays 31b, 31c, 32b, and 32c of two or more segments 3 to edge opening of a slot 2 are also as another member, and it is \*\*. Two layers of maintenance fixtures 21 shown, for example with the first operation form can be formed

in shaft orientations, a bottom maintenance fixture can be chiefly made into the attachment component for segment maintenance, and it can consider as the interior material of a proposal which shows a bottom maintenance fixture to a segment nose of cam.

Moreover, you may arrange in the direction of a path, without arranging two or more segments 3 to multiplex. Also in such a segment array, the holders 21 and 22 of an above-mentioned operation form are effective as equipment which conveys two or more segments collectively and is correctly inserted in a stator core 1.

Availability on industry this invention can be suitably carried out in the manufacture method of the strong AC-generator stator for vehicles of the request of a high increase in power, and its manufacturing installation about the manufacture method of the AC-generator stator for vehicles carried in a passenger car, a truck, etc., and its manufacturing installation.

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[Translation done.]

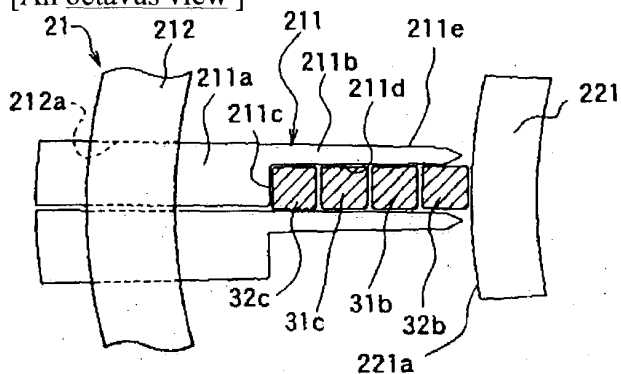
## \* NOTICES \*

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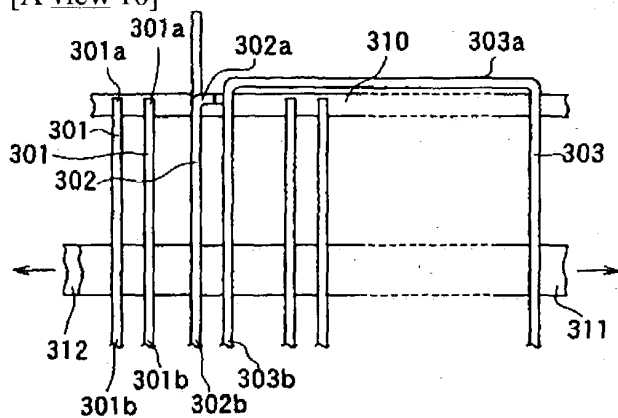
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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DRAWINGS

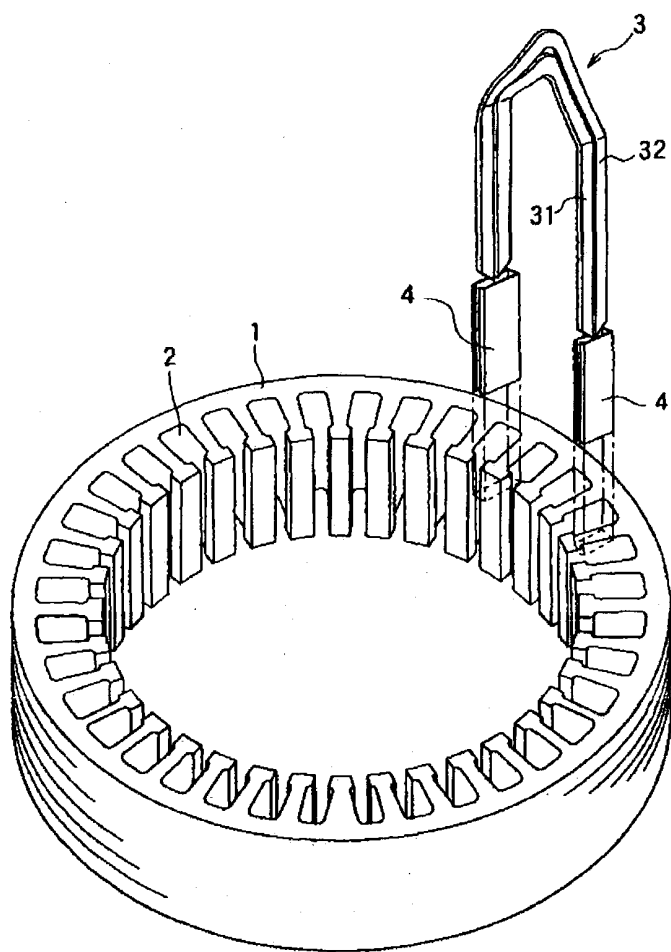
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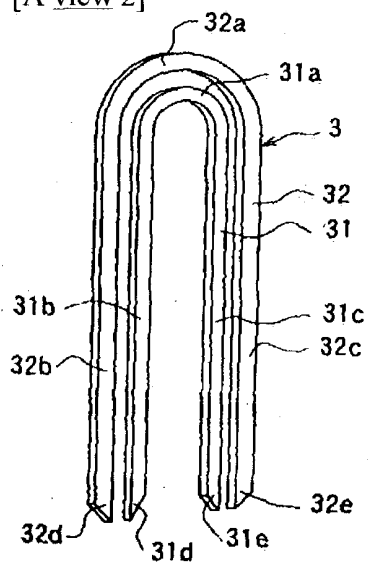
[A view 16]



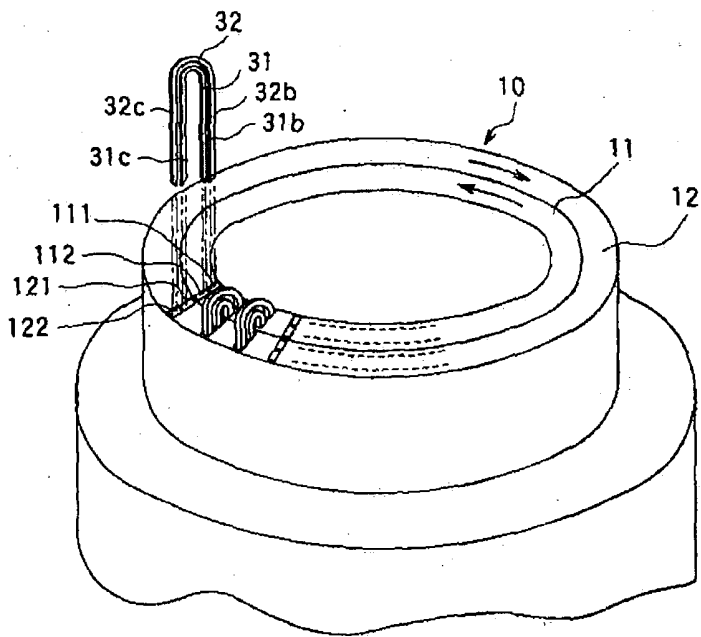
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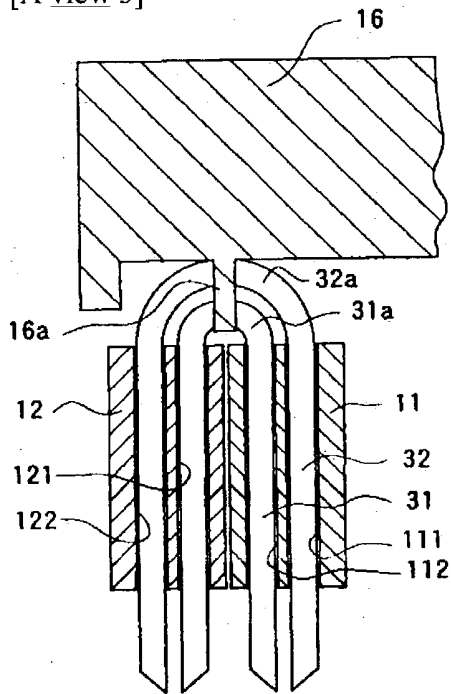
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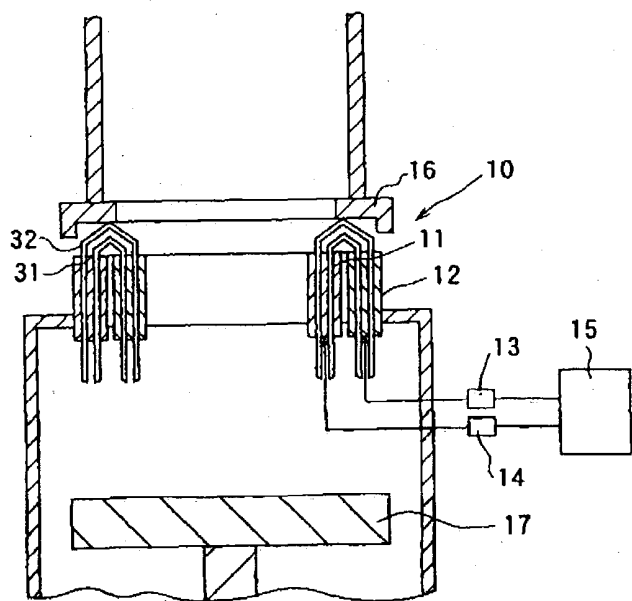
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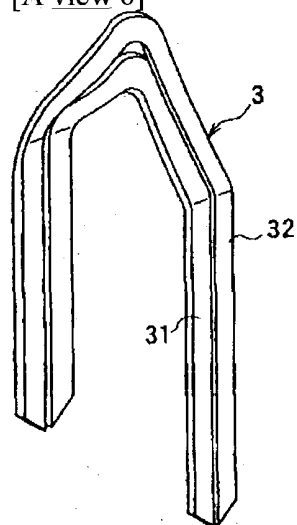
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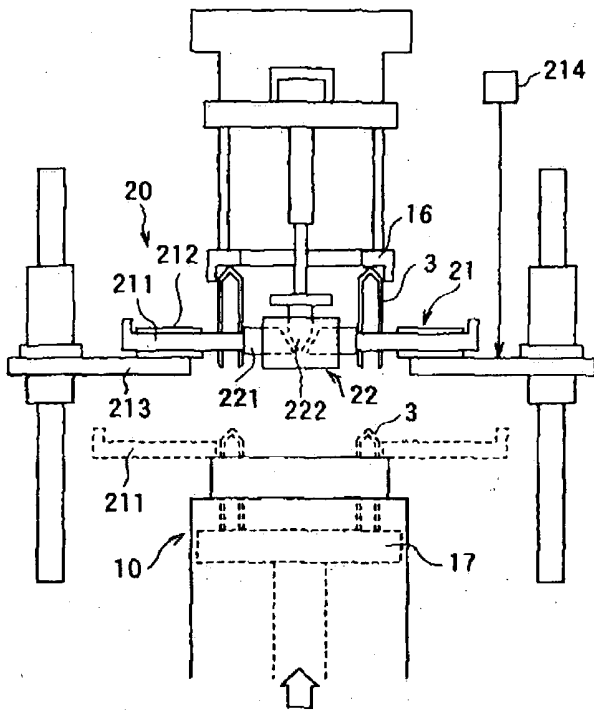
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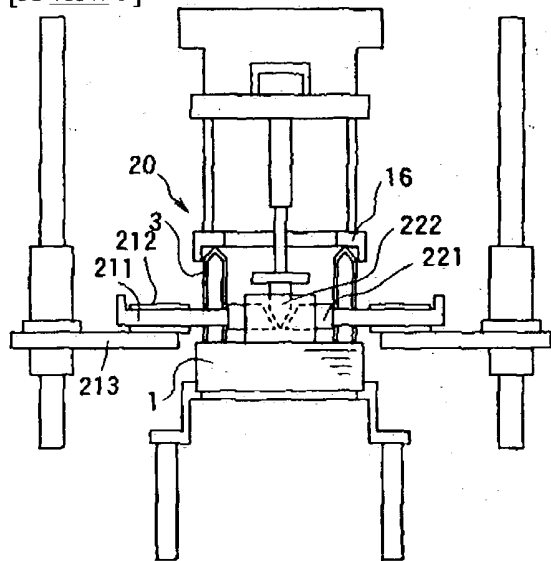
[A view 6]



[A view 7]

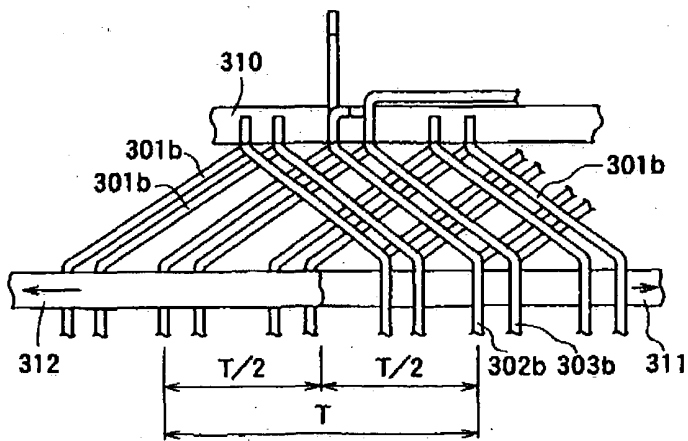


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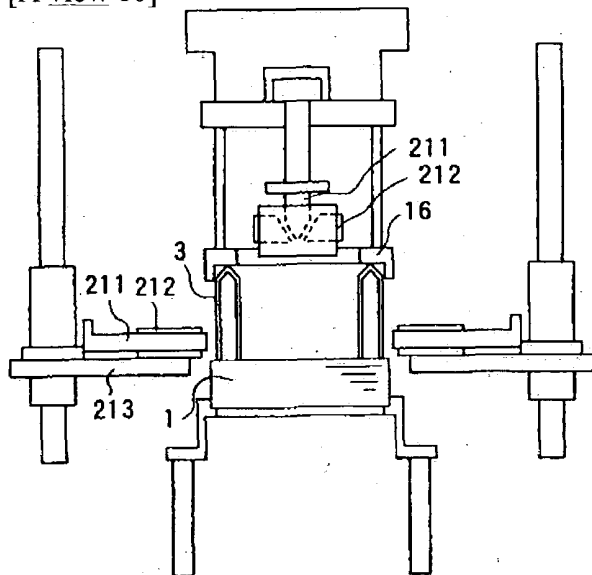


[A view 17]

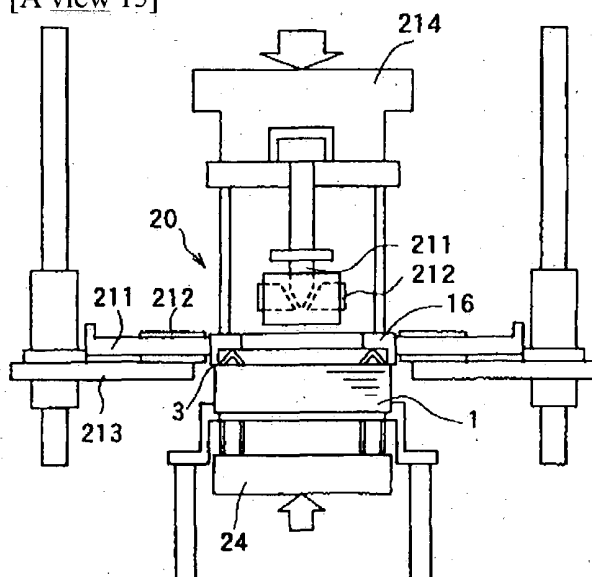




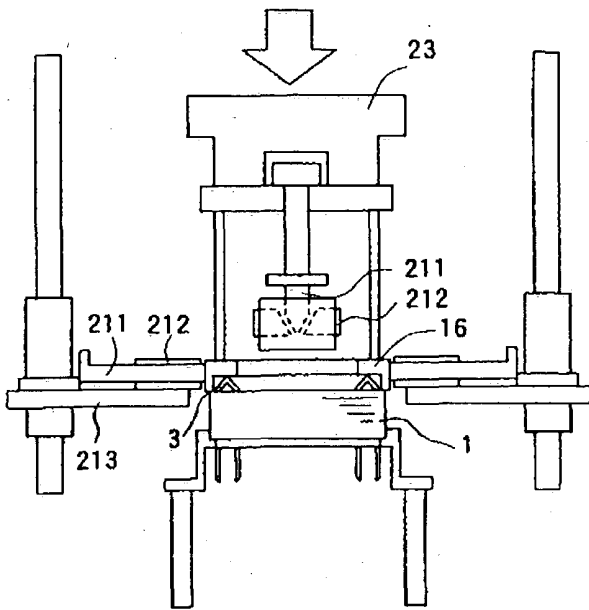
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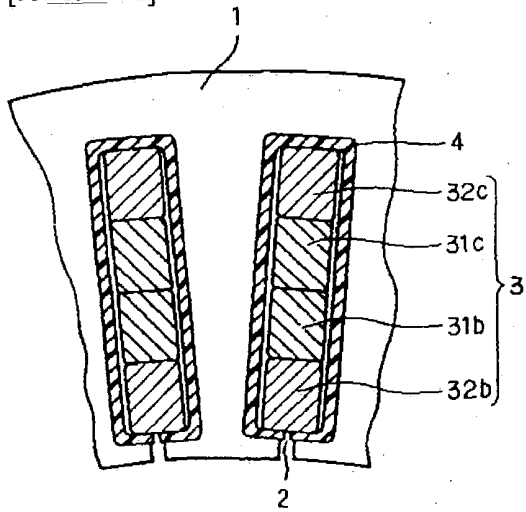
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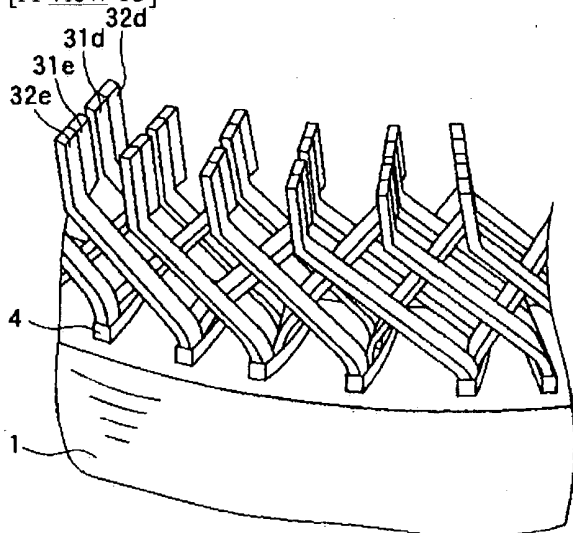
[A view 11]



[A view 12]



[A view 13]



[A view 14]

